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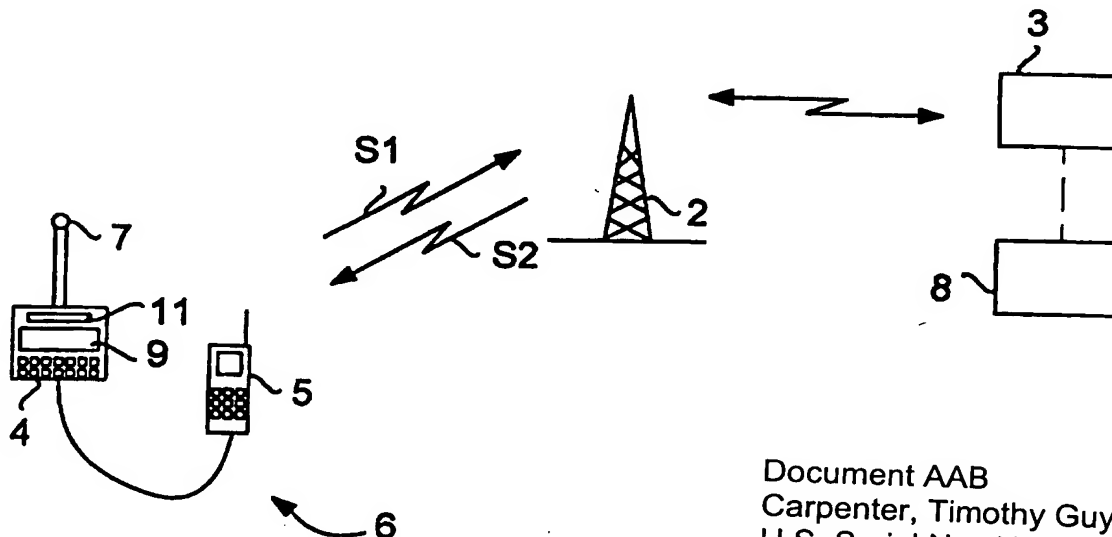
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## (57) Abstract

The present invention relates to a parking fee system comprising: a parking fee register (8) in which information is maintained on the vehicles within the system for the parking of which payment is made at each time. In order to provide a user-friendly and easily controllable system, the system comprises: a vehicle-specific identification means from which a vehicle code of a vehicle is readable by machine, and a control device (6) for reading automatically the vehicle code from the identification means, for transmitting a control request of the payment or non-payment of the parking fee and for notifying the user of the device (6) of the information included in the control information message (S2). The invention also relates to an identification means and a control device (6).

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Parking fee system, control device and identification means

5           The present invention relates to a parking fee system comprising: a parking fee register in which information is maintained on the vehicles within the system for the parking of which payment is made at each time. The invention also relates to a control device for controlling the payment of a parking fee in a system  
10           comprising a parking fee register in which information is maintained on the vehicles within the system for the parking of which payment is made at each time. The invention also relates to a vehicle-specific identification means comprising attachment means for  
15           attaching the identification means onto a vehicle, and on which a vehicle-specific vehicle code of the vehicle is indicated by letters and/or numbers.

          In this application the concept parking fee register refers generally to the register itself  
20           consisting data and to a computer equipment by means of which the register is maintained and by means of which the contents of the register can be checked.

          Prior art teaches parking fee systems in which a driver of a vehicle immediately after the starting of  
25           parking calls a predetermined service number with a mobile phone and dials a digit sequence with the mobile phone for paying the parking fee. In that case the digit sequence dialled by the driver includes the code of the parking space in which the driver has parked the  
30           vehicle, for example. Information is stored into the parking fee register of the system on that the car has been parked, whereby the system starts calculating the parking fee on the basis of predetermined hourly charging. Similarly, at the end of parking, the caller  
35           makes a new call, whereby information is stored into the

parking fee register on that the parking has terminated. In this known system a traffic warden uses a portable computer which receives information from the parking control register and which is capable of informing if a parking fee is being paid from a parking space with a specified code at that moment.

The most significant disadvantage of the above system is that each parking space within the system has to have a separate code of its own. This causes considerable practical problems in cities, for example, in which there may be a great number of parking spaces. For example, the system is totally unusable on streets where specific parking spaces have not been indicated.

Another disadvantage of the above system is that it is difficult to control. In order that a traffic warden could control if a parking fee is being paid from a specified parking space, the code of said space, street or part of town should be entered into the terminal for controlling. Said process is understandably rather slow and very laborious.

The object of this invention is to solve the above-mentioned problems and provide a user-friendly parking fee system in which parking control is very easy. This object is achieved with the system according to the invention that is characterized in that the system comprises: a vehicle-specific identification means from which a vehicle code of a vehicle is readable by machine, and a control device for reading automatically the vehicle code from the identification means, for transmitting a control request message containing the vehicle code to the parking fee register, and for receiving a control information message informing of the payment or non-payment of the parking fee and for notifying the user of the device of the information included in the control information message.

In this context, the reading of the vehicle code by machine or automatically refers to reading the contents of for instance a bar code or an inductive tag, i.e. an escort memory, whereby a vehicle-specific code can be supplied to the control device without the user needing to feed the code manually into the device. In this context, a tag, i.e. an escort memory refers to a unit known per se which includes a memory circuit the data contained in which can be read by measuring the change caused by the tag into a magnetic field prevailing in its environment. The data contained in the tag can typically be read through all non-metal objects, such as the windscreen of a vehicle. A typical reading distance varies between 5 to 50 cm depending on the used antenna.

The invention is based on the idea that when all the vehicles within the parking fee system are provided with vehicle codes that are readable by machine, parking control can be made car-specifically, whereby the utilization of the system does not require significant changes (such as numbering the parking spaces) into the infrastructure, or that vehicles should have valuable devices needed for collecting the parking fee. The identification means needed in vehicles are very inexpensive and at their simplest comprise of a bar code sticker, but they are very significant for the control as a traffic warden is then not required to feed manually the code into the control device for identifying the vehicle, but it is sufficient that the control device is placed in the vicinity of the identification means after which the control device finishes the procedure. The most significant advantages of the system according to the invention is that it is user-friendly, simple and fast to control and the device costs are low.

The invention also relates to a control device that can be employed in the system according to the invention. The control device according to the invention is characterized in that the control device comprises:  
5 reading means for reading automatically the vehicle code of a vehicle, transmitter means for transmitting a control request message containing the vehicle code to the parking fee register and receiver means for receiving a control information message informing of the  
10 payment or non-payment of the parking fee and for notifying the user of the device of the information included in the control information message.

The transmitter and receiver means of the control device preferably consists of a radio part  
15 utilizing the GSM mobile telephone system, whereby connection to a parking control register can be realized by using existing telecommunication connections. When the control device is also provided with a printer, a parking ticket can be automatically printed by it when  
20 necessary by means of the information stored into the parking fee register and the information supplied by the user of the device. Thus the giving of a parking ticket will become significantly easier and faster.

When the control device is provided with a  
25 display screen indicating the registration number of the checked car in the parking fee register, it can be made sure that in actual fact it is the vehicle the vehicle code belongs to. The falsification of a vehicle-specific identification means is thus prevented as there is no  
30 use falsifying/copying a sticker with a bar code.

The invention further relates to a vehicle-specific identification means that can be employed in the system according to the invention. The identification means according to the invention is  
35 characterized in that the identification means comprises

means with the help of which the vehicle code of the vehicle is readable by machine. When a sticker used as an identification means is attached to a predetermined place in the vehicle, onto the windscreen, for example, a traffic warden can immediately at a glance find out if a specified vehicle is within the system. If this is so, the traffic warden can then control if the parking is being paid for by placing the control device near the identification means, whereby the control device will notify after a while if a parking fee is being paid for the vehicle or not.

The preferred embodiments of the system, control device and the identification means according to the invention are disclosed in the appended dependent claims 2 to 3, 5 to 9 and 11. The invention will in the following be explained by means of one preferred embodiment of the system according to the invention with reference to the appended figures, in which

Figure 1 illustrates parking taking place in accordance with the invention,

Figure 2 shows a block diagram of the first preferred embodiment of the parking system according to the invention,

Figures 3a and 3b illustrate information maintained in the parking control register, and

Figure 4 shows a first preferred embodiment of the identification means according to the invention.

Figure 1 illustrates parking taking place in accordance with the invention. In the case shown in Figure 1, the driver calls with a GSM mobile phone 1 to a predetermined service number for registering the start of parking to the parking fee register. If the driver does not have a GSM mobile phone in use, the call can be made to the service number in question with any other

phone, with a coin-operated telephone situated near the parking area, for example.

After having dialled the service number, the driver will next enter a personal user code. If, however, the driver has in use a GSM phone or the like in which the user code is stored into a function card activating the phone, such as the SIM card (Subscriber Identification Module) of the GSM phone, the user's user code can be registered into the parking fee register automatically without the user code having to be entered manually. If the driver, however, uses somebody else's GSM phone, by entering the user code of his/her own, the driver can direct the parking fee to be charged from himself/herself and not from the owner of the phone. The structure and operation of the GSM system is described for example in *The GSM System for Mobile Communications*, by M. Mouly & M. Pautet, Palaiseau, France, 1992, ISBN:2-9507190-0-0-7, wherefore it will not be described more closely herein.

After having entered the user code (if it is necessary), the driver next enters the code of the parking zone which is indicated on a near-by traffic sign P or the like.

After having entered the zone, the driver enters the vehicle code of the vehicle in use which is indicated on an identification means, that is, a sticker T, for example, attached to the windscreen. Only numbers are preferably included in the vehicle code and in all the other information supplied via a phone, wherefore it will be easy to enter the code and forward it by a phone. The vehicle code is also indicated on the sticker T in a form readable by machine, for example as a bar code. Alternatively, a tag of 64 bits, for example, may be integrated into the sticker from which the vehicle code is readable inductively.



It is not necessary to enter the vehicle code if the vehicle used by the driver is the driver's own permanent vehicle. In that case the parking fee system is able to find out on the basis of the user code the vehicle code supplied as a default value corresponding to the user code. That is, it is necessary to supply the user code only if the driver uses some other vehicle than the permanent vehicle of his/her own.

It is apparent from the above that in the simplest case when a driver is driving a permanent vehicle of his/her own and uses a GSM phone of his/her own, the driver needs not enter anything else but the service number of the parking fee system and the parking zone code when parking.

When the parking is being terminated, the driver re-enters said service number and his/her user code if a GSM phone of his/her own is not used. Then information is transmitted on the termination of parking to the parking fee register.

Figure 2 shows a block diagram of a first preferred embodiment of the parking system according to the invention. Figure 2 shows a base station 2 of the GSM system and a mobile switching centre 3 and a parking fee register 8 connected to the mobile switching centre, the register comprising a computer unit and one or more registers maintained by it. The parking fee register need not be in direct contact with the mobile switching centre 3, but a fixed telephone network may establish the connection.

A traffic warden uses a control device 6 which in the case of Figure 2 comprises a computer unit 4 and an ordinary GSM mobile phone 5 connected to it. When a traffic warden arrives at a parked vehicle, he/she first checks visually if a sticker T is attached to the windscreen of the vehicle, which indicates that the

vehicle belongs to the parking fee system according to the invention. If this the case, the traffic warden then places a read head 7 of the control device near the sticker and presses an activation key in the control device. Then the read head 7 automatically reads the vehicle code of the vehicle from the identification means of the vehicle, that is, from the sticker by means of the bar code or the tag therein.

When the vehicle code 10 has been read, the control device 6 calls automatically to a predetermined service number of the parking fee register 8 with the GSM phone 5. When a connection has been established, the control device 6 sends a control request message containing the vehicle code to the parking fee register. The parking fee register checks if a parking fee is being paid at that moment for the vehicle in question. When the check has been completed, the parking fee register sends a control information message S2 to the control device 6 by the Short Message Service SMS of the GSM system, for example.

When the control device 6 receives a control information message S2, it notifies the information it contains to the traffic warden by means of a display screen 9. The display screen then shows:

- the registration code of the vehicle
- the code of the zone the parking fee is being paid for,
- the starting time of parking,
- the remaining parking time.

The control device 6 preferably comprises a printer 11 with which the traffic warden can automatically print a parking ticket if the parking has not been paid for or if the maximum parking time has been exceeded. In this case, the control device adds the information in the control information message S2 into

the parking ticket to be printed automatically, in addition to which the traffic warden may enter manually additional information to the parking ticket by means of the keyboard of the device 4. The control device may also notify the parking fee register of the fine, whereby the parking ticket may be automatically added to the telephone bill of the owner/user of the vehicle.

Although the control device in the case of Figure 2 is in two parts, it can naturally also be comprised of one part, whereby a radio part 5 is integrated into the computer unit 4. The radio part 5 of the control device does not necessarily need to operate in the GSM system, but it may as well be connected to the parking fee register 8 via some other radio system.

Figures 3a and 3b illustrate information maintained in the parking control register. The parking fee register may for example comprise two separate databases in the first of which subscriber data is maintained and in the second information is maintained on the vehicles that at that moment are paying a parking fee.

Figure 3a illustrates a subscriber data register in which information is maintained on every subscriber within the system. The subscriber data register indicates a user code 12, a vehicle code 10 of the vehicle normally used by the subscriber, a registration number 13 of the vehicle normally used by the subscriber and information needed for charging the subscriber, such as a telephone number 14 to the telephone bill of which the subscriber's parking fees will be added.

The user code 12 is preferably selected so that it contains information relating to the home country and home town of the user and information needed for

charging, such as the code of the user's teleoperator. Thus the parking fee system will become international, whereby parking taking place in a neighbouring country, for example, can be paid by using the same system.

5           When a subscriber registers into the parking fee register in connection with parking, said information is retrieved from the subscriber data register as default values for the register maintaining information on parked cars. That means that if the  
10       subscriber does not enter separately the vehicle code, the system assumes that a payment is being made for a vehicle that is indicated at the user code in question in the subscriber register.

15           Figure 3b illustrates a register maintained on parked cars. Traffic wardens, for example, find out from this register if a prescribed parking fee is being paid for a specified vehicle. The register indicates the vehicle code 10 of the parked vehicle, the registration number 13, a code 15 of the notified zone, a starting  
20       time 16 of parking and the number 14 of the telephone to the telephone bill of which the parking fee is added.

25           The parking system is capable of finding out by means of the zone code 15 in which town the parking takes place, the hourly charging prescribed for parking and the longest allowed parking time. When the system  
30       can also independently find out the precise starting time 16 of parking by means of the timer of the parking fee register, the remaining parking time can be settled by simple calculation. Similarly, the system can  
35       calculate the accumulated parking fee by multiplying the time interval between the starting time and terminating time of parking by the hourly charging determined for the parking zone.

          Figure 4 shows a first preferred embodiment of the identification means according to the invention. In

the case of Figure 4, the identification means T consists of a sticker attached to the windscreen of a vehicle in which sticker the vehicle code 10 is indicated by numbers. Also, the vehicle code is indicated in the identification means in a form readable by machine, that is, as a bar code 18 in the case of Figure 4. When needed, the bar code 18 of Figure 4 can be replaced by an inductively readable tag, i.e. an escort memory of some millimetres in size which can be attached to the back side of the sticker with glue, for instance.

It is to be understood that the specification above and the figures relating thereto are only meant to illustrate the present invention. The different variations and modifications of the invention will be obvious to one skilled in the art without deviating from the scope and spirit of the appended claims.

## Claims

1. A parking fee system comprising:

5 a parking fee register (8) in which information is maintained on the vehicles within the system for the parking of which payment is made at each time, c h a r a c t e r i z e d in that the system comprises:

10 a vehicle-specific identification means (T) from which a vehicle code (10) of a vehicle is readable by machine, and

15 a control device (6) for reading automatically the vehicle code (10) from the identification means (T), for transmitting a control request message (S1) containing the vehicle code to the parking fee register (8), and for receiving a control information message (S2) informing of the payment or non-payment of the parking fee and for notifying the user of the device (6) of the information included in the control information message (S2).

20 2. A parking fee system according to claim 1, c h a r a c t e r i z e d in that the vehicle-specific identification means (T) comprises a bar code (18) from which the vehicle code is readable optically or an escort memory from which the vehicle code (10) is readable inductively, whereby reading means (7) of the control device (6) include a bar code reader or, 25 respectively, an inductive reading device.

30 3. A parking fee system according to claim 1, c h a r a c t e r i z e d in that the parking fee register maintains information on the vehicle code (10), a registration number (13), a parking zone (15), the starting time (16) of parking of the parked vehicle and the number (17) of the telephone to the telephone bill of which the parking fee is added.

4. A control device (6) for controlling the payment of a parking fee in a system comprising a parking fee register in which information is maintained on the vehicles within the system for the parking of which payment is made at each time, characterized in that the control device comprises: reading means (7) for reading automatically the vehicle code (10) of a vehicle, transmitter means (5) for transmitting a control request message (S1) containing the vehicle code to the parking fee register (8) and receiver means (5) for receiving a control information message (S2) informing of the payment or non-payment of the parking fee and for notifying the user of the device (6) of the information included in the control information message.

5. A control device according to claim 4, characterized in that the reading means (7) comprise a bar code reader.

6. A control device according to claim 4, characterized in that the reading means (7) comprise means for reading inductively the vehicle code (10) stored into an escort memory.

7. A control device according to one of claims 4 to 6, characterized in that the transmitter and receiver means (5) comprise a radio part utilizing the GSM mobile telephone system, whereby signalling between the control device (6) and the parking fee register (8) is carried out by using the GSM system.

8. A control device according to one of claims 4 to 7, characterized in that the control device (6) comprises a user interface (4) provided with a keyboard and a printer (11) for printing a parking ticket in response to information included in the control information message (S2) and/or to information

supplied by the user of the device by means of the keyboard.

5 9. A control device according to one of claims 4 to 8, c h a r a c t e r i z e d in that the control device (6) has a display screen (9) on which it notifies the user of the device of the information included in the control information message (S2) at least the registration number (13) of the vehicle, the code of the parking fee zone (15) from which payment is made for  
10 said vehicle at each time, and the remaining parking time.

15 10. A vehicle-specific identification means (T) comprising attachment means for attaching the identification means onto a vehicle, and on which a vehicle-specific vehicle code (10) of the vehicle is indicated by letters and/or numbers, c h a r a c t e r i z e d in that the identification means (T) comprises means (18) by which the vehicle code (18) of the vehicle is readable by machine.

20 11. An identification means according to claim 10, c h a r a c t e r i z e d in that said identification means (T) comprises a sticker attachable by glue onto the windscreen, and that said means (18) readable by machine comprise an optically readable bar  
25 code printed onto the sticker or an inductively readable escort memory integrated into the sticker.



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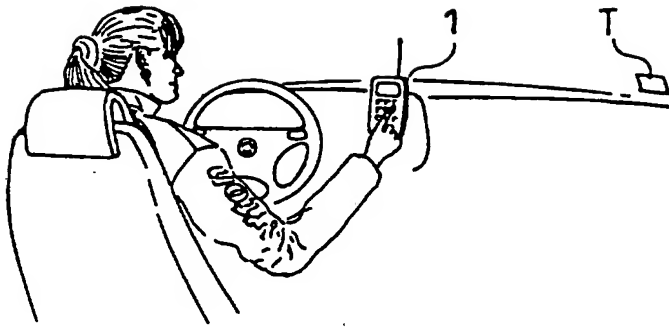
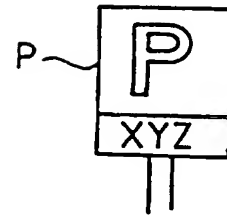


FIG. 1

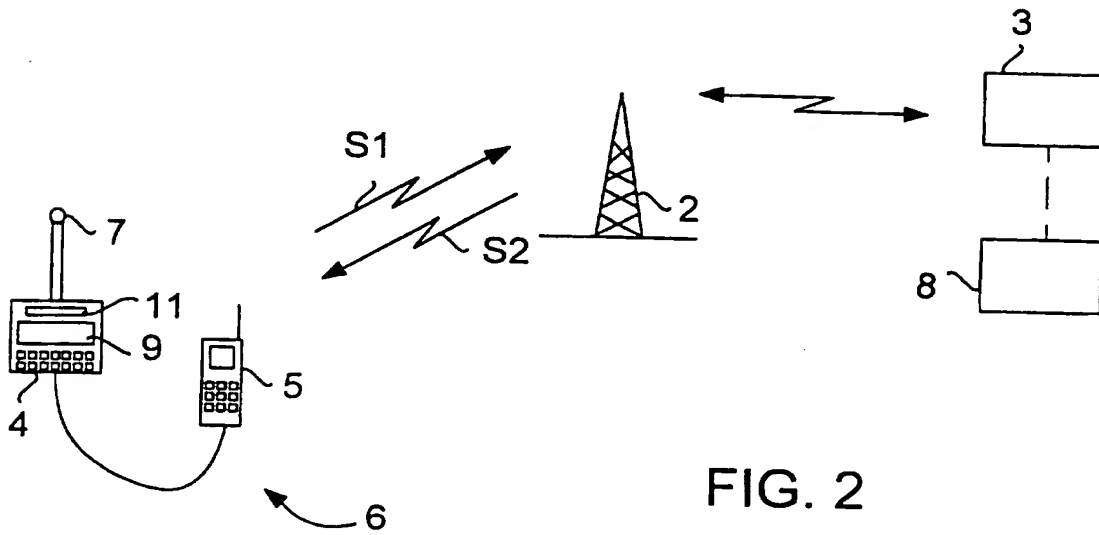


FIG. 2

ABC	1234567	ZAK-253	654321
12	10	13	14

FIG. 3a

1234567	ZAK-253	XYZ	20:15	654321
10	13	15	16	14

FIG. 3b

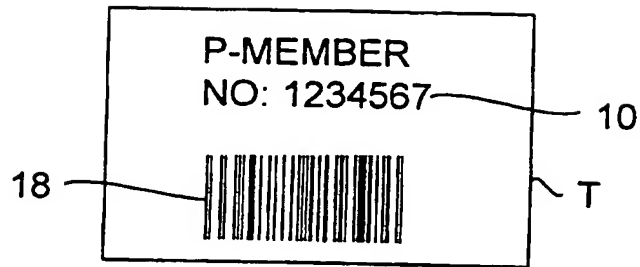


FIG. 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 96/00114

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: G07C 1/30, G07F 17/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: G07C, G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 9320539 A1 (T. JONSSON), 14 October 1993 (14.10.93), see whole document	1-9
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Y	US 4555618 A (B.N. RISKIN), 26 November 1985 (26.11.85)	1-9
X		10-11
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Y	US 4908500 A (P. BAUMBERGER), 13 March 1990 (13.03.90), see whole document	1-9
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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4958064 A (R.D KIRKPATRICK), 18 Sept 1990 (18.09.90), see whole document	1-9
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International application No.

PCT/FI 96/00114

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